“Wind Energy Development”

1st Regulatory Advisory Panel Meeting

Virginia Department of Environmental Quality

Richmond, July 22, 2009

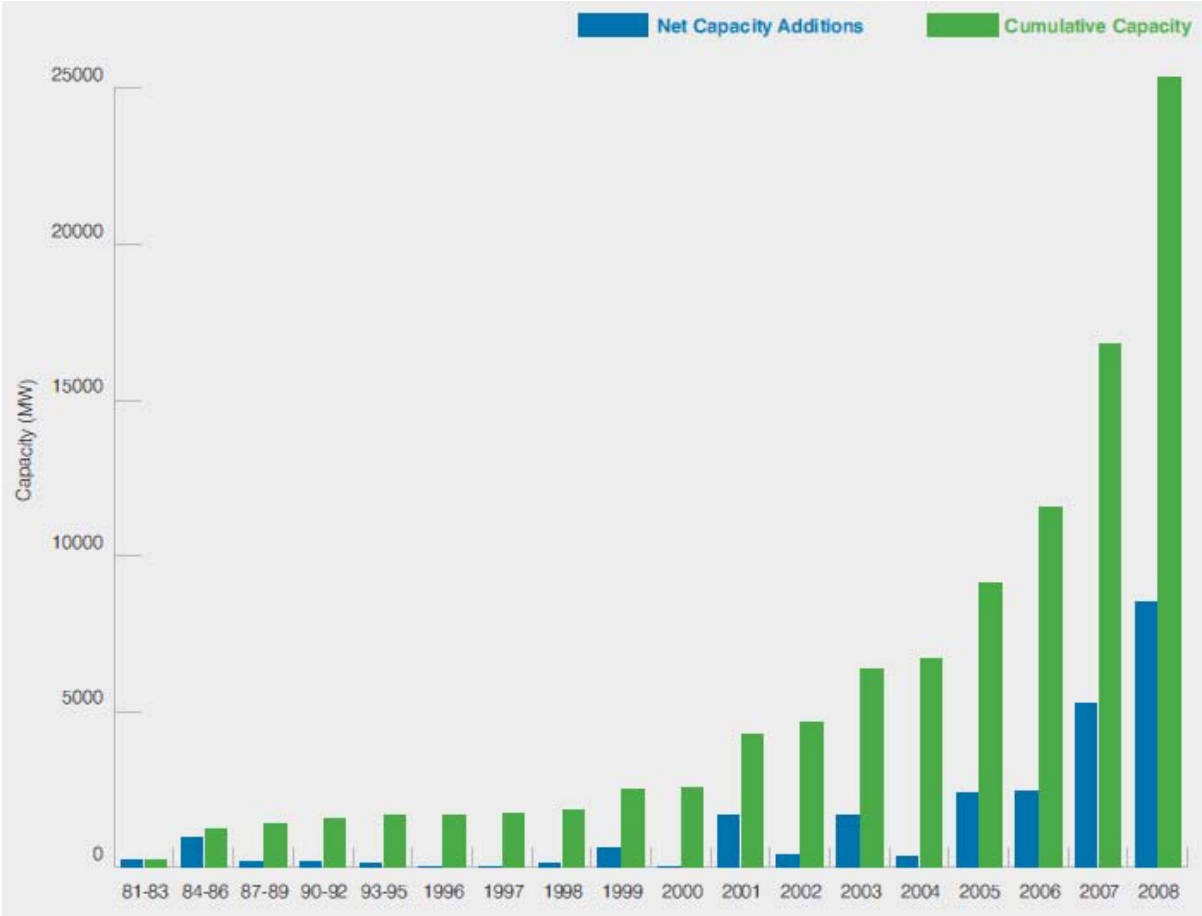
AGENDA

1. Overview of the current US wind energy industry
2. Wind energy in Virginia?
3. Development process
4. Permitting Case History
5. Construction

Overview of the US wind energy industry

- 25,300 MW installed capacity by end of 2008 (more than 2800 MW added during the 1st quarter of 2009)
- $17 Billion industry providing jobs to over 85,000 people
- In 2008 US generated 52 Million MWH from wind: 1.2% of electricity consumption; offsetting 44 Million tons of Carbon emissions (equivalent to taking 7 million cars off the road).

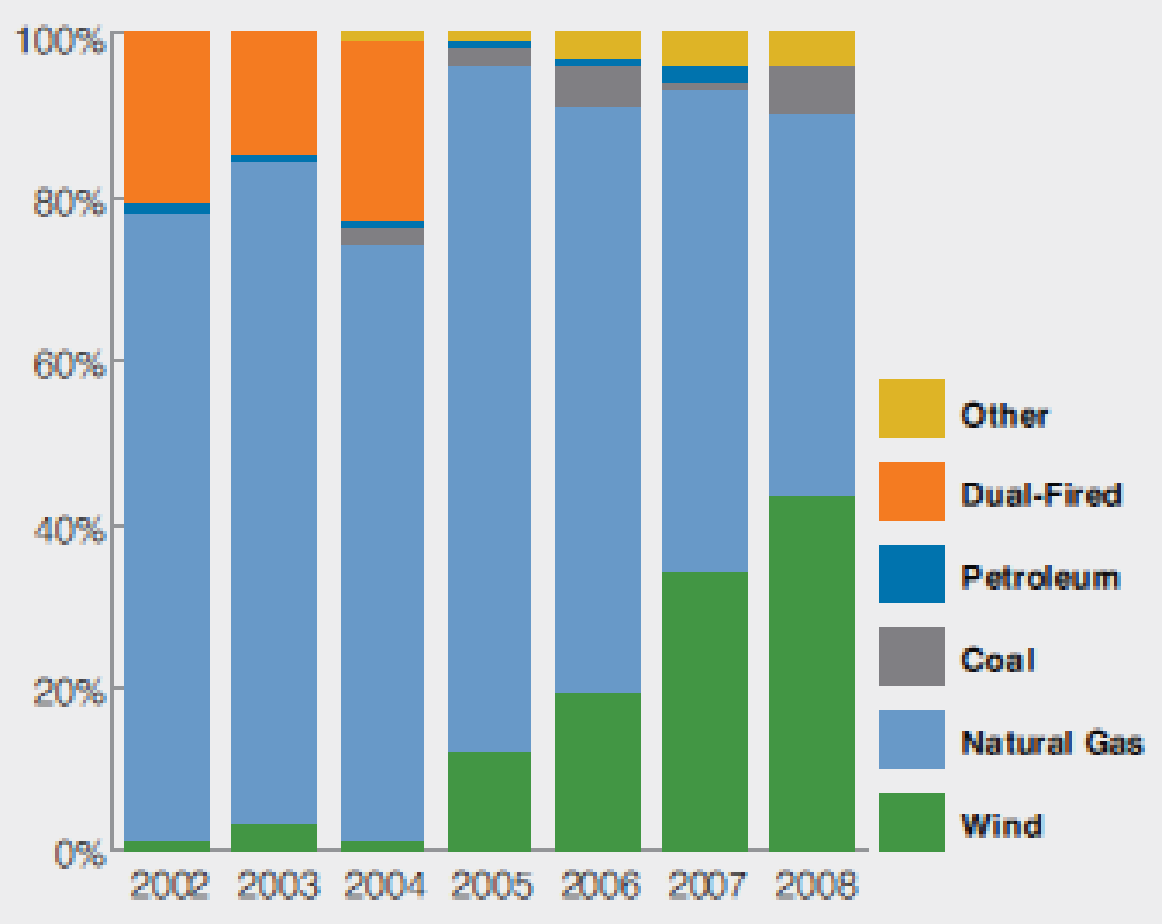
Installed Wind Energy Capacity in US



Source: AWEA

Overview of the US wind energy industry

Percentage of new generation capacity additions in US



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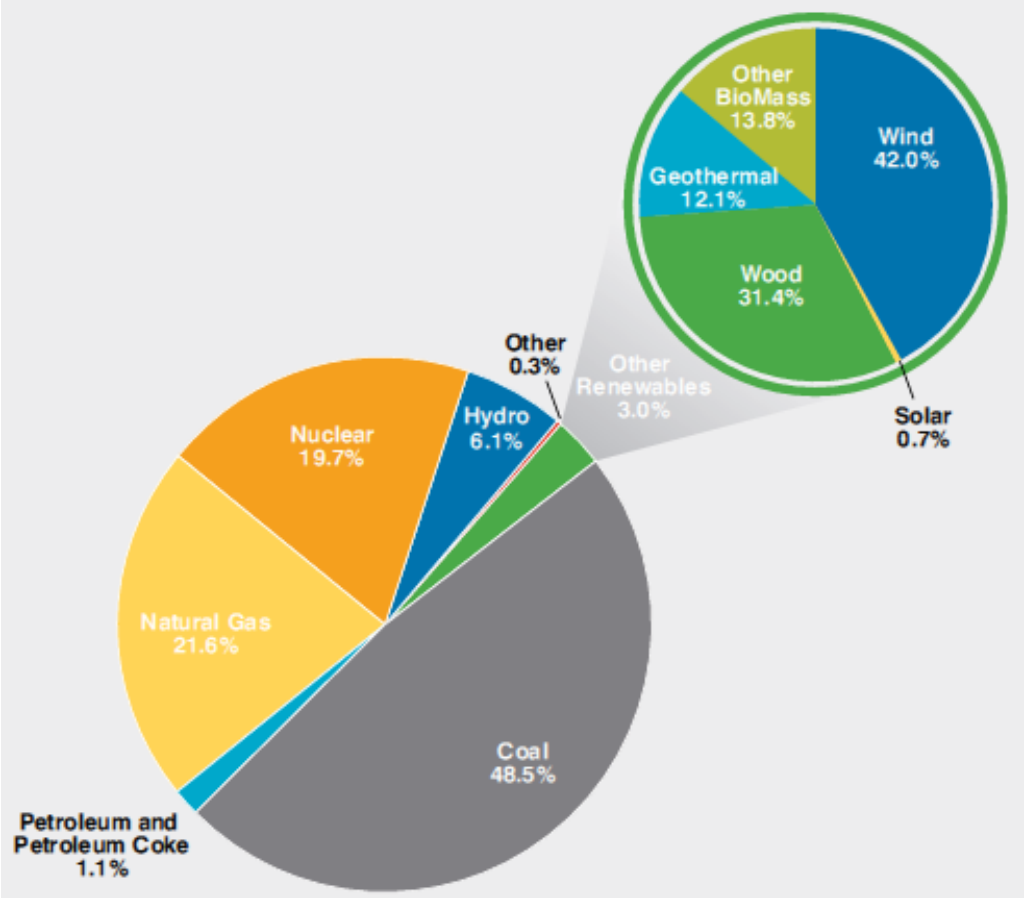
Overview of the US wind energy industry

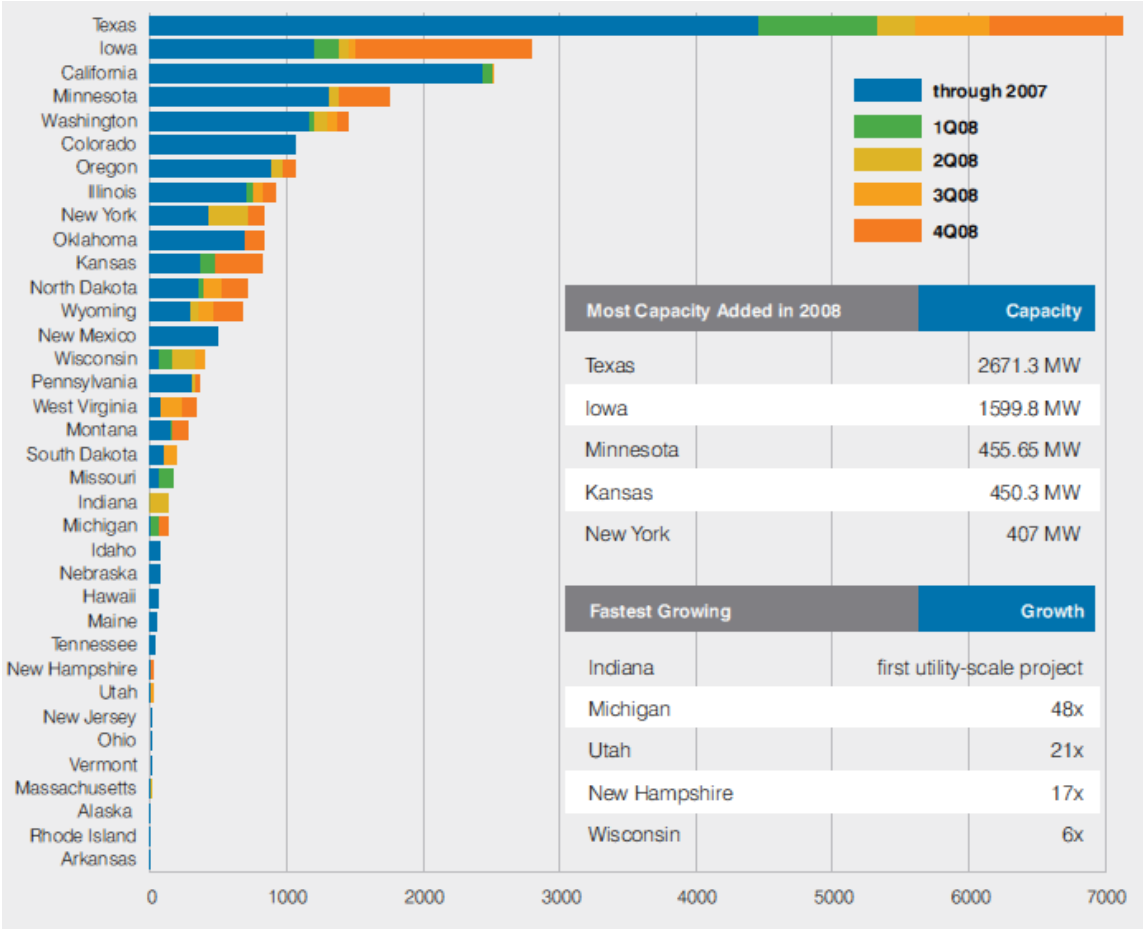
Renewable Energy as percentage of US electrical consumption



Source: AWEA

Overview of the US wind energy industry

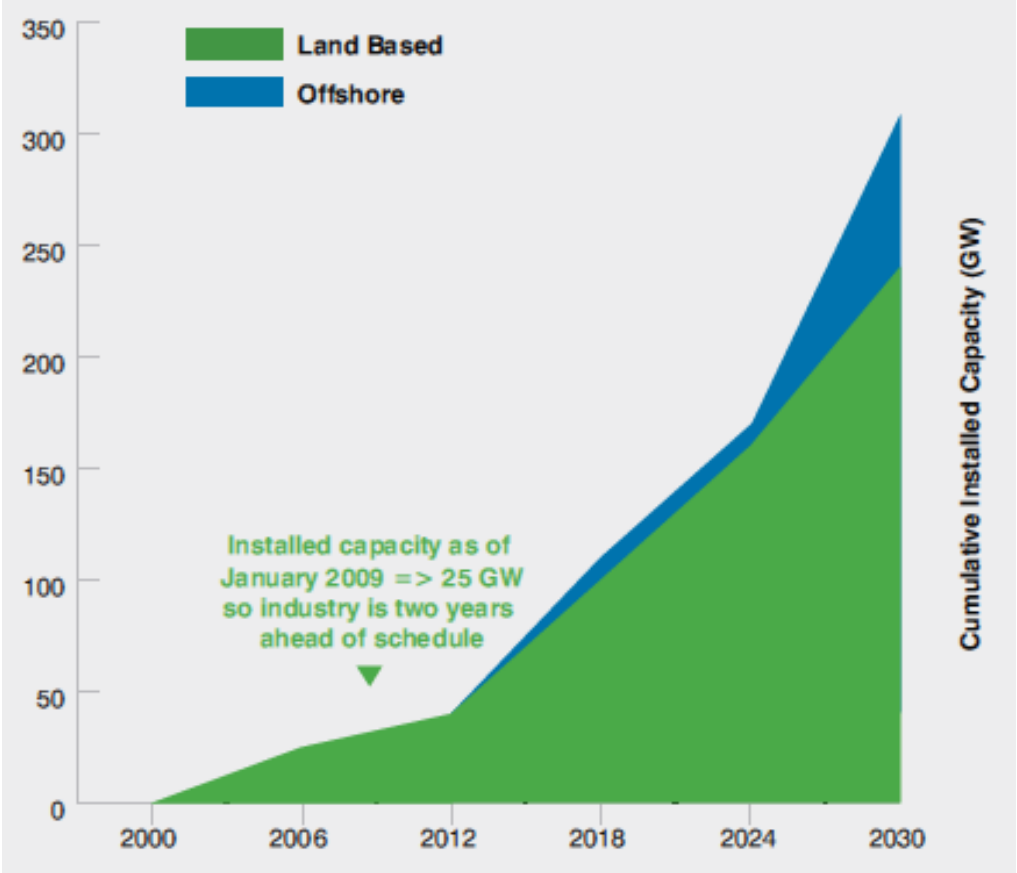
- Thirty-five states host utility scale wind-powered electricity generation
- Per April 1, 2009 more than 2000 MW of operating wind energy on the East Coast.
- Minnesota gets 7.5% of their electricity supply from wind energy
- Sophisticated forecasting tools are applied to schedule (intermittent) wind energy in a reliable way into the electricity supply mix



Source: AWEA

Overview of the US wind energy industry

- Department of Energy (DOE) report – April, 2008: wind energy 20% of US electricity supply by 2030
- Pickens Plan: > 20% of US electricity supply by wind energy
- Biggest constraint: Transmission, connecting the wind resource in central part of the US with load centers in coastal regions
- More than 250 GW of wind energy is current under development (based upon queue positions)



Source: AWEA

Wind energy in Virginia?

- DOE estimates that the onshore wind energy potential in Virginia is 1778 MW
- Wind Resource concentrated in mountains (elevations > 3000 ft), coastal areas and offshore.
- 560 MW of wind power capacity under active development (6 projects listed in PJM queue)
- Constraints for wind energy development in Virginia:
  - Lots of the wind resource is located in National Forest and other “protected” areas
  - Wind is new for Virginia communities resulting in opposition
  - Complex and capital/labor intensive permitting process
- No legislative drivers (RPS)
- Offshore:
  - Extensive, feasible offshore wind resource (estimated at 6572 MW by DOE) located in proximity of large load centers in Tidewater region
  - On-going Research project by Virginia Coastal Energy Research Consortium (Virginia State Agencies and Universities)

Development Process

I. Site selection
- Wind Energy has impact and the developer's job is the minimize and/or mitigate this impact
- Fatal flaw screening
- Site selection criteria:
  a) Compatibility with current land-use
  b) Wind Resource
  c) Proximity to interconnection
  d) Access Roads
  e) Access to market

II. Land acquisition
- Option for lease and/or easement
- Title work

Development Process

III. Data collection

- Wind Resource Assessment
- Environmental data (avian, bats, endangered species, etc.)
- Engineering studies, such as: Geotech; Communication paths; Logistical; etc.
- Visual impact studies and simulations

Visual Simulation Mill Run – Pennsylvania Project

Development Process

IV. Interconnection feasibility

- Application filing with Regional Transmission Organization (PJM)
- Three stage study process
  - Feasibility study;
  - System Impact study
  - Facility study
- Interconnection Agreement

V. Outreach

- Local community
- Environmental community
- Federal and state agencies

Development Process

VI. Project Design and Engineering

- Layout based upon optimization of wind resource utilization in combination with siting regulations and land-owner feedback
- Complex and reiterative process

VII. Permitting

- Federal:
  - Does NEPA apply?
  - Applicable wetlands permits
  - NPDES
  - FAA
- Local:
  - Depending on applicable state regulations: “Home” and/or Central rule

Development Process

VIII. Commercial and Financial

- Off-take
- Financing

Development process can take 36 to 72 months

Permitting Case History

- Casselman Wind Project
  - 34.5 MW consisting of 23 GE 1.5 MW wind turbines
  - 3 miles of new roads; 5 miles of 34.5 kV power collection system (partly above-ground)
  - Located in Somerset County, Pennsylvania
  - Development started during the summer of 2003
  - Construction during the summer and fall of 2007
  - Commercial operation started in December, 2007
- Environmental Data Collection
  - Phase I Avian and Wildlife Impact Assessment, including consultation with federal and state agencies regarding possible impact and existence of protected and endangered species on the project site
  - One year radar study to asses nocturnal (migratory) avian and bat activity; Acoustic monitoring of bat activity
  - Mist netting for federally-protected bat species
  - Field surveys by certified biologists for on-site nesting of state protected grassland birds, state-protected rattlesnakes and federally-protected eagle nest sites

Permitting Case History

- County Permit Process: Somerset County adopted wind specific provisions in its ordinance that wind projects have to comply with. The Casselman project submitted a Land Development Plan that fully complied with the ordinance and required no variances to the ordinance. In case variances were required, the County would conduct a public hearing process in which possible opponents can participate.

- National Pollutant Discharge Elimination System (NPDES/Stormwater) Permit:
  - Somerset county acted as “delegated authority” because “high-quality stream drainage” was avoided
  - NPDES process required clearance vis-a-vis wildlife impacts for three state agencies (Fish and Boat, Game Commission and Department of Conservation and Natural Resources). Due to the presence of state-protected grassland birds at the project site, the project committed to off-site habitat replacement mitigation for grassland birds.
  - NPDES process in Pennsylvania currently also requires clearance from US Fish and Wildlife.

- A wetlands survey indicated that the wetlands impact were minimal; Upon confirmation of these findings by the County Conservation District a General Wetland Permit was issued by the Pennsylvania Department of Environmental Protection (PA DEP)

Permitting Case History

- As the project was partially located on reclaimed strip mining land, the post-mining plan had to be modified and approved by the Mining Division of the PA DEP
- The Federal Aviation Administration issued a “No Hazard” determination (equivalent to permit) that the project had no negative impact on nearby military and aviation operations and recommended obstruction lighting for the project.
- Non-discretionary permits (such as building, road crossings, transportation permits) were issued by the appropriate township, county and state agencies.

Construction

Road Grading

Construction

Big Equipment

Construction

Site Preparation

Construction

Foundations

Construction

Power Collection System

Construction

Wind Turbine Installation

Construction

Wind Turbine Installation

Construction

Grid-Interconnection (substation)

Questions